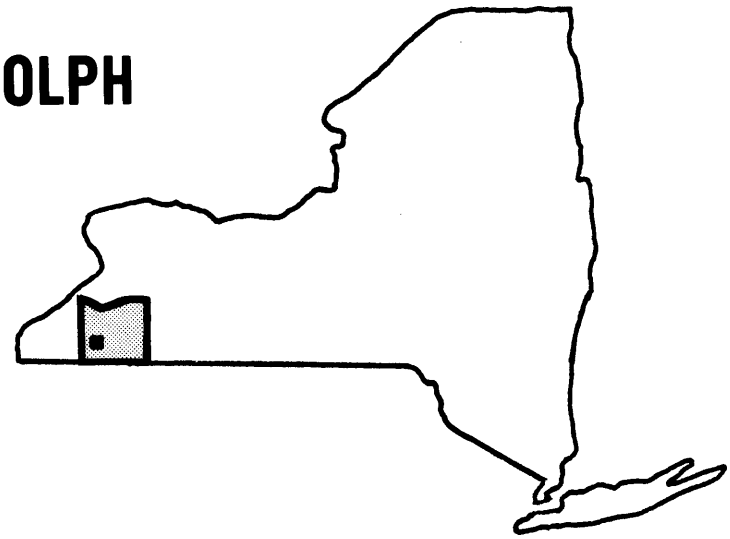
FLOOD INSURANCE STUDY

VILLAGE OF EAST RANDOLPH
CATTARAUGUS COUNTY,
NEW YORK



AUGUST 1977

U.S. DEPARTMENT of HOUSING & URBAN DEVELOPMENT
FEDERAL INSURANCE ADMINISTRATION

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FLOOD INSURANCE STUDY
VILLAGE OF EAST RANDOLPH, NEW YORK

1.0 INTRODUCTION

1.1 Purpose of Study

The purpose of this Flood Insurance Study is to investigate the existence and severity of flood hazards in the Village of East Randolph, Cattaraugus County, New York, and to aid in the administration of the Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. Initial use of this information will be to convert the Village of East Randolph to the regular program of flood insurance by the Federal Insurance Administration (FIA). Further use of this information will be made by local and regional planners in their efforts to promote sound land use and flood plain development.

1.2 Coordination

At a meeting on July 28, 1975, with representatives of the Village of East Randolph, the FIA, the Cattaraugus County Planning Board, and the New York State Department of Environmental Conservation, the purpose of the Flood Insurance Study was explained.

A search for basic data was made at all levels of government. The U. S. Geological Survey (USGS) was contacted to obtain contour maps showing drainage boundaries.

On August 25, 1976, a meeting was held with officials of the village to obtain additional local input. The final meeting of Consultation and Coordination was held on January 19, 1977, where the final draft on the Flood Insurance Study was presented for further local comment. This meeting was attended by village officials, representatives of the FIA, and the New York State Department of Environmental Conservation. No comments critical to the report were received at this time.

1.3 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968, as amended.

The hydrologic and hydraulic analyses for this study were done by the New York State Department of Environmental Conservation (DEC), for the Federal Insurance Administration under Housing and Urban Development Contract No. H-3856.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Village of East Randolph which is located in Cattaraugus County in western New York State. The area of study is shown on the Vicinity Map (Figure 1).

There are two water courses which affect the village; Elm Creek, and the Stillson Pond Tributary. Elm Creek flows in a southwesterly direction, through the center of the village, for a total distance of 7,920 feet between corporate limits. The Stillson Pond Tributary flows west a distance of 2,240 feet from the easterly corporate limit to its confluence with Elm Creek in the village.

Because of the scattered development within the flood plain it was agreed among representatives of the FIA and the Village of East Randolph that both streams were to be studied in detail.

The area studied in detail was chosen with consideration given to all forecasted development and proposed construction for the next five years (through March 1980).

2.2 Community Description

The Village of East Randolph is located in the lower western part of the county, in the western part of the state, on the adjoining eastern corners of the Towns of Conewango and Randolph. It is approximately 10 miles east of the City of Jamestown. Figure 1 is a map showing the corporate boundaries of the village, which has an area of one square mile.

The village is within the Conewango Creek Watershed which is characterized by two distinct physiographic areas; an upland area of moderately steep topography, and a broad flat valley floor. The village is located in the southeastern corner of the watershed, at the edge of the valley floor. This valley, with an average width of two to three miles, has been filled with till and other glacial deposits. These deposits are alluvial glacial lakes types which are generally subject to erosion and poor drainage conditions (Reference 1).

The village, which was incorporated in 1881, is a small residential center in the midst of an agricultural community. The land use of the areas surrounding the village is divided between agricultural

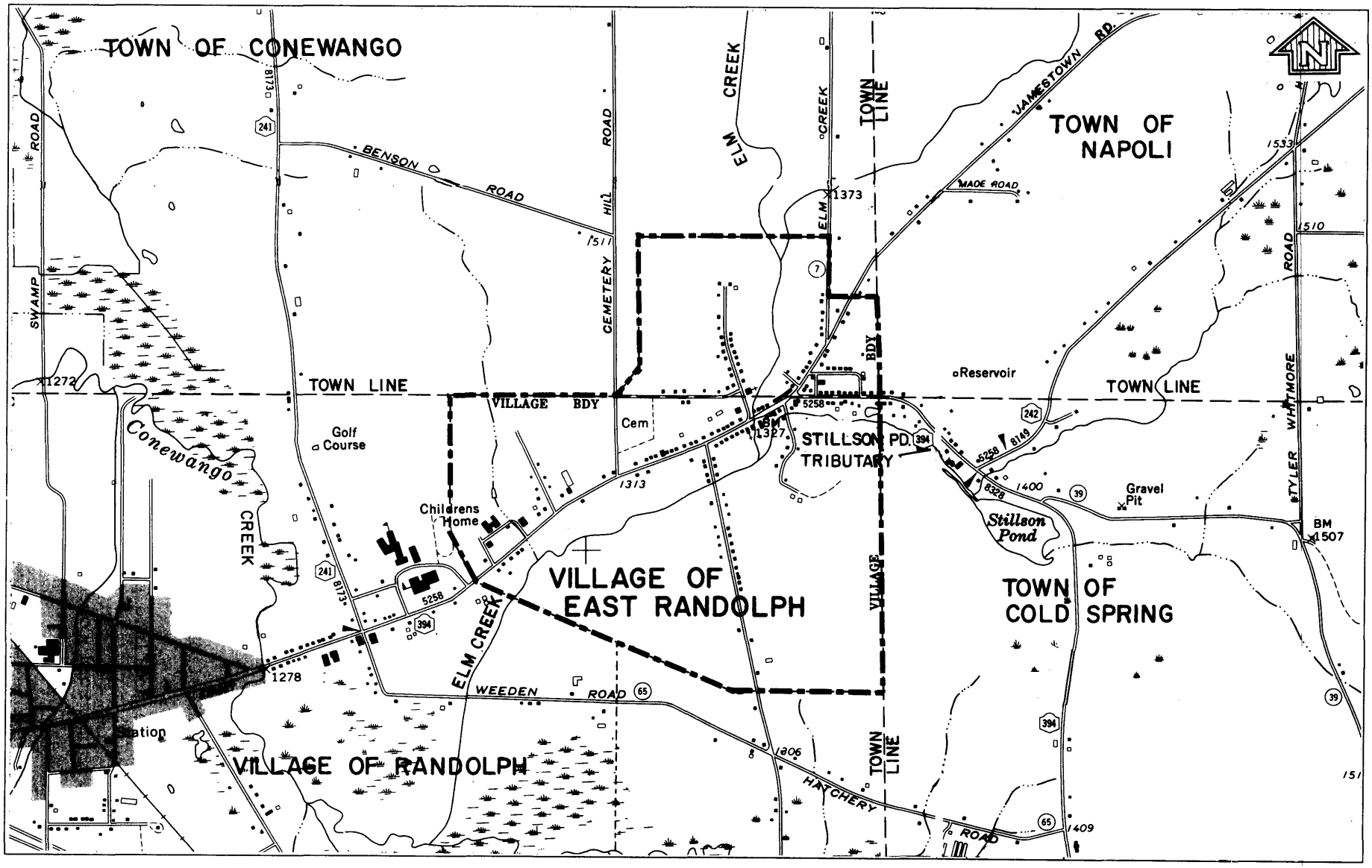


FIGURE 1

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

APPROXIMATE SCALE
0 2000 4000 6000 8000 FEET

VICINITY MAP

uses and forest/brush cover. The population of the village has grown steadily from a 1960 census count of 594 persons, to a 1970 count of 636 persons, which is an increase of 14 percent (Reference 2).

Precipitation in the watershed averages 42 inches per year, with 23 inches of runoff. Precipitation is generally well-distributed throughout the year, with slightly lower averages during January, February, March, and April. It is during this period, however, that major storms often occur, resulting in sudden intense downpours. The area has a mean annual snowfall of 82 inches, and the average annual temperature is 46°F (Reference 3).

The major watercourse of the village is Elm Creek, which flows into the West Branch of the Conewango Creek. The West Branch flows south into Conewango Creek, which continues south to the City of Warren, in the Commonwealth of Pennsylvania, where it joins the Allegheny River. The Allegheny continues to Pittsburgh where it joins with the Monongahela River to form the Ohio River.

Stillson Pond Tributary, also studied in detail, flows westward from the Town of Cold Spring to its confluence with Elm Creek within East Randolph.

Photographs of portions of the flood plain along Elm Creek are shown in Figures 2 and 3.

2.3 Principal Flood Problems

Due to the steep terrain of the surrounding area, East Randolph is subject to flash flooding from cyclonic disturbances of high intensity, even if such storms are of short duration. The most frequent floods result from these disturbances in winter or early spring, augmented by melting snow.

There is no dependable record of major floods within the area, as there are no gaging stations located in or near the village. Interviews with local residents, however, indicate that the event of September 1967 is thought to be the maximum known occurrence for the area.

2.4 Flood Protection Measures

There are no flood protection measures located within the village. Benefit is derived from the Conewango Creek Watershed Project of the U. S. Soil Conservation Service (Reference 4). The Watershed

Figure 2 - Village of East Randolph - Elm Creek looking south (downstream) from bridge on Main Street

Figure 3 - Village of East Randolph - Elm Creek looking west (downstream) from bridge on Spring Street

Project is an improvement works plan to provide watershed protection, flood prevention, public and private fish and wildlife development, and agricultural water management. This is to be accomplished through the construction of 20 flood water retardation structures, eight of which are currently complete, and 30 miles of various channel improvements. Two of the completed structures are located on Elm Creek upstream from the Village of East Randolph and provide flood protection benefits for the community. This long-range project was authorized in April of 1968 and was scheduled for completion by 1980. However, progress on the project has been delayed until some additional replanning is completed and an Environmental Impact Statement is prepared. This will delay completion until approximately 1982.

The two flood water retardation structures on Elm Creek are located approximately one mile, and 3.5 miles upstream from the Village of East Randolph. They are designed to alleviate the annual flooding problems previously experienced within the village, but have only a limited effect on higher frequency flooding events. The effects of these structures were considered in the computations. No other uncompleted projects in the Conewango Creek Watershed Work Plan will affect flooding in the Village of East Randolph.

3.0 ENGINEERING METHODS

For the streams studied in detail in the Village of East Randolph, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required. Floods having recurrence intervals of 10, 50, 100, and 500 years have been selected as having special significance for flood plain management and flood insurance premium rates. The analyses reported here reflect current conditions in the drainage areas of the streams.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for both streams studied in detail in the community.

For the Village of East Randolph, a base discharge was established through the use of a Bureau of Public Roads Technique (Reference 5). This technique utilizes a correlation between discharge and major basin characteristics such as drainage area, topography, and precipitation.

Using the base discharge and a log-Pearson Type III distribution (Reference 6) as a base method for flood flow frequency studies, the required frequency discharges were calculated.

This methodology conforms with the uniform technique for determining flood flow frequencies as set forth by the Hydrology Committee of the United States Water Resources Council (Reference 7).

A summary of discharges and drainage areas for Elm Creek and Stillson Pond Tributary is shown in Table 1.

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
ELM CREEK					
Downstream Limit of Study	18.1	990	1,416	1,603	2,070
Cross Section F	15.0	864	1,233	1,396	1,803
STILLSON POND TRIBUTARY					
Cross Section G (Mouth of Stillson Pond Tributary)	2.3	125	179	202	261
At Eastern Village Boundary	2.2	125	179	202	261

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the streams studied in detail in the community were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these streams.

Flood profiles were calculated using the COE HEC-2 Water-Surface Profiles Computer Program (Reference 8).

Cross-sections were located at close intervals above and below bridges, at control sections along the stream length, and at significant changes in ground relief, land use, or land cover. Locations of the selected cross-sections used in the hydraulic analyses are shown on the Flood Boundary and Floodway Map (Exhibit 2).

Reach lengths for the channel were measured along the centerline of channel. Between sections and overbank reach lengths were measured along the approximate centerline of the effective out-of-channel flow area.

Roughness coefficients (Manning's "n") of 0.04 in the channel and 0.08 in the overbank areas, were assigned on the basis of on-site field inspections and ground level photographs. These "photographs" were compared with USGS calibrated photographs (Reference 9), taking into consideration channel conditions, overbank vegetation and land use.

The starting water-surface elevations for Elm Creek were obtained from the backwater analyses for Elm Creek contained in the Flood Insurance Study for the Village of Randolph, currently being completed by the study contractor. Starting elevations for Stillson Pond Tributary came from the Elm Creek analyses at the confluence of the two streams. All elevations in this report are measured in feet above National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as mean sea level datum with the 1929 general adjustment.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of ± 0.5 foot for floods of the selected recurrence intervals (Exhibit 1). All elevations are referenced from NGVD; elevation reference marks used in the study are shown on the maps.

Flood elevations in the village are often raised by ice jams; the hydraulic analyses for this study, however, are based only on the effects of unobstructed flow. The flood elevations as shown on the profiles are thus considered valid only if hydraulic structures in general remain unobstructed and dams and other flood control structures described above operate properly and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

A prime purpose of the National Flood Insurance Program is to encourage state and local governments to adopt sound flood plain management programs. Each Flood Insurance Study, therefore, includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For the streams studied in detail, the boundaries of the 100- and the 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections,

the boundaries were interpolated using topographic maps developed for use in this study from aerial photographs at a scale of 1"=400' with a contour interval of 5 feet (Reference 10). In cases where the 100- and the 500-year flood boundaries are close together, only the 100-year boundary has been shown. These flood boundaries are shown on the Flood Boundary and Floodway Map (Exhibit 2).

Small areas within the flood boundaries may lie above the flood elevations, and therefore, may not be subject to flooding; owing to limitations of the map scale, or lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artificial fill, reduces the flood-carrying capacity, increases the flood heights of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood height to 1.0 foot, provided that hazardous velocities are not produced. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

The floodway presented in this study was computed on the basis of equal conveyance reduction from each side of the flood plain. The results of these computations are tabulated at selected cross sections for each stream studied in detail (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the boundaries of the floodway and 100-year flood are either close together or are colinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION		
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	WITH FLOODWAY (NGVD)	WITHOUT FLOODWAY (NGVD)	DIFFERENCE (FT.)
Elm Creek							
A	1,900	120	343	4.7	1,298.2	1,298.1	0.1
B	3,830	61	316	5.1	1,312.2	1,311.2	1.0
C	4,650	49	190	7.3	1,316.5	1,316.5	0.0
D	5,210	57	217	6.4	1,320.4	1,320.3	0.1
E	6,630	59	176	7.9	1,330.1	1,329.9	0.2
F	7,800	75	232	6.0	1,340.0	1,339.5	0.5
Stillson Pond Tributary	DISTANCE[2]						
A	45	35	133	1.5	1,315.8	1,315.8	0.0
B	870	20	47	4.3	1,324.1	1,324.1	0.0
C	1,540	19	29	7.0	1,331.9	1,331.9	0.0

[1]FEET ABOVE CORPORATE LIMITS
[2]FEET ABOVE MOUTH

TABLE 2

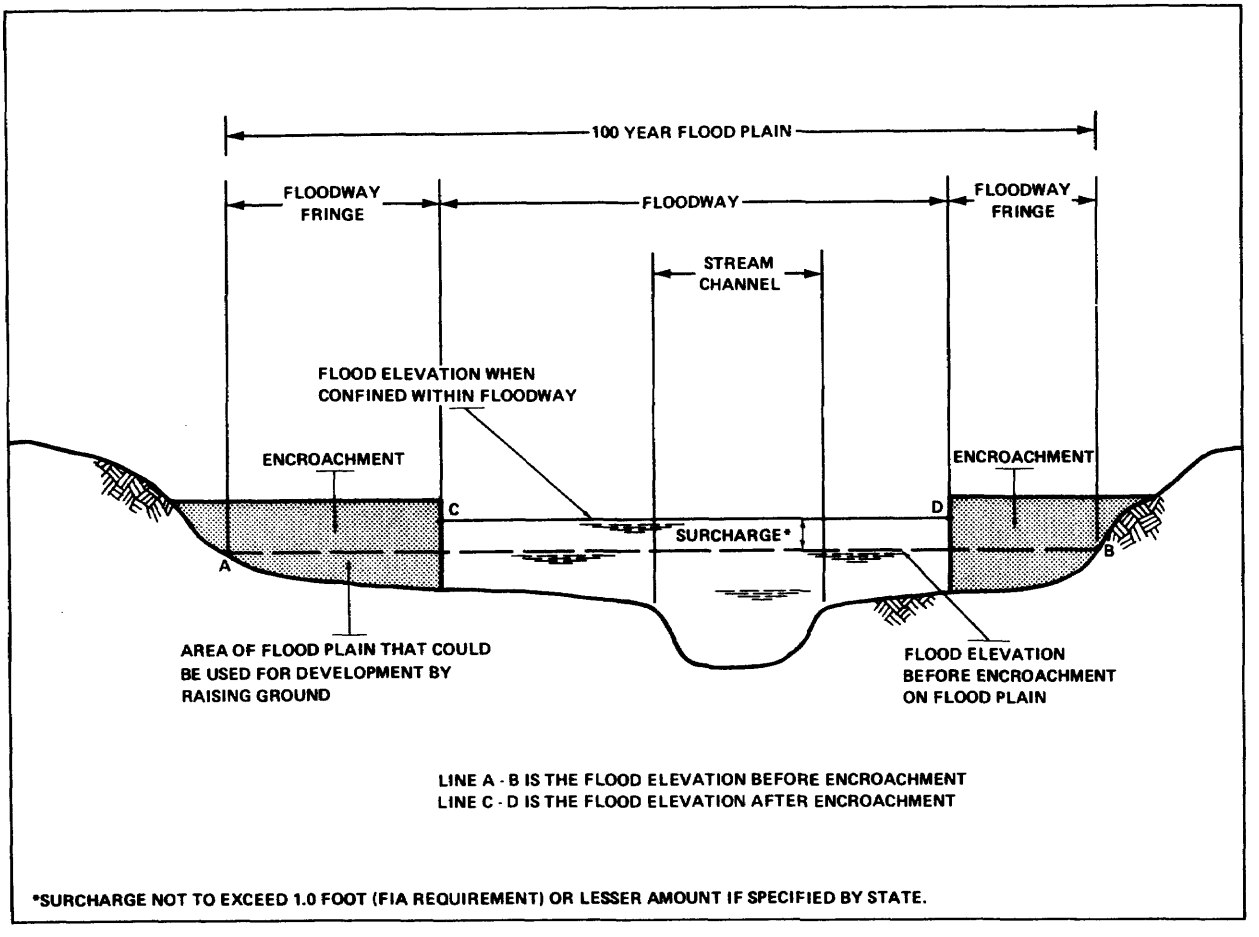
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

FLOODWAY DATA

ELM CREEK AND STILLSON POND TRIBUTARY

without increasing the water-surface elevation of the 100-year flood more than 1.0 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.



FLOODWAY SCHEMATIC Figure 4

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHF), and flood insurance zone designations for each flooding source affecting the Village of East Randolph.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in

water-surface elevations of the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot

Two reaches meeting the above criterion were required to establish flood insurance zones for the Village of East Randolph. These included one each on Elm Creek and on the Stillson Pond Tributary. The locations of these reaches are shown on the Flood Profiles (Exhibit 1).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHF are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest one-half foot, and shown as a three-digit code. For example, if the difference of water-surface elevations between the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire area of study was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zone A1, A2: Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to Flood Hazard Factors.

Zone B: Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; and areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot. Zone B is not subdivided.

Zone C: Area of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for each flooding source studied in detail in the Village of East Randolph.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Village of East Randolph is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

The U. S. Soil Conservation Service performed a flood study for the area surrounding East Randolph, which resulted in the development of the Conewango Creek Watershed Work Plan (Reference 4). Results of this report were used in generating data for the Flood Insurance Study for the Village of East Randolph. No other flood studies have been found for the Village of East Randolph.

The New York State Department of Environmental Conservation is currently preparing Flood Insurance Studies for other communities within the Allegheny Basin. Communities being studied include the Town of Napoli, Village of Randolph, and the Town of Cold Spring, all of which are contiguous to the Village of East Randolph. All data used in the Village of East Randolph Flood Insurance Study is being coordinated with the data for these other communities.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3]
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
Elm Creek Reach 1	0001A	-0.77	-0.24	0.52	010	A2	Varies
Stillson Pond Tributary Reach 1	0001A	-0.69	-0.18	0.39	005	A1	Varies

[1] FLOOD INSURANCE RATE MAP PANEL
[2] WEIGHTED AVERAGE
[3] ROUNDED TO NEAREST FOOT – SEE MAP

TABLE 3

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

FLOOD INSURANCE ZONE DATA

ELM CREEK AND STILLSON POND TRIBUTARY

This study is authoritative for the purposes of the Flood Insurance Program and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

All data necessary to reproduce the Flood Insurance Study are being retained on file until January 1, 1982, at the New York State Department of Environmental Conservation, 50 Wolf Road, Albany, New York 12233. These data include base maps, topographic maps, cross-section survey data, backwater computations, and other supporting information.

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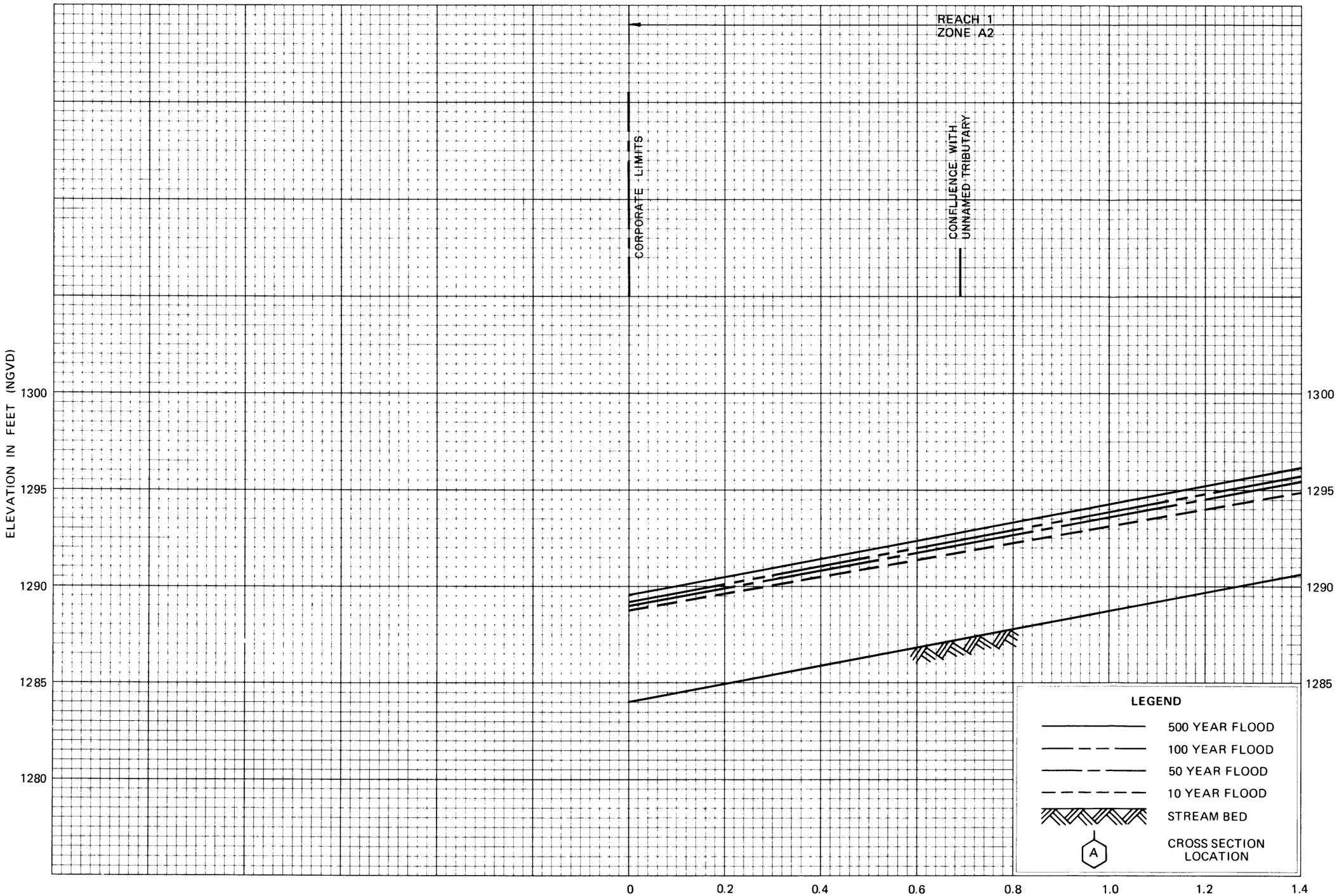
----------Community description and local flooding information from officials and longtime area residents.



FLOOD PROFILES

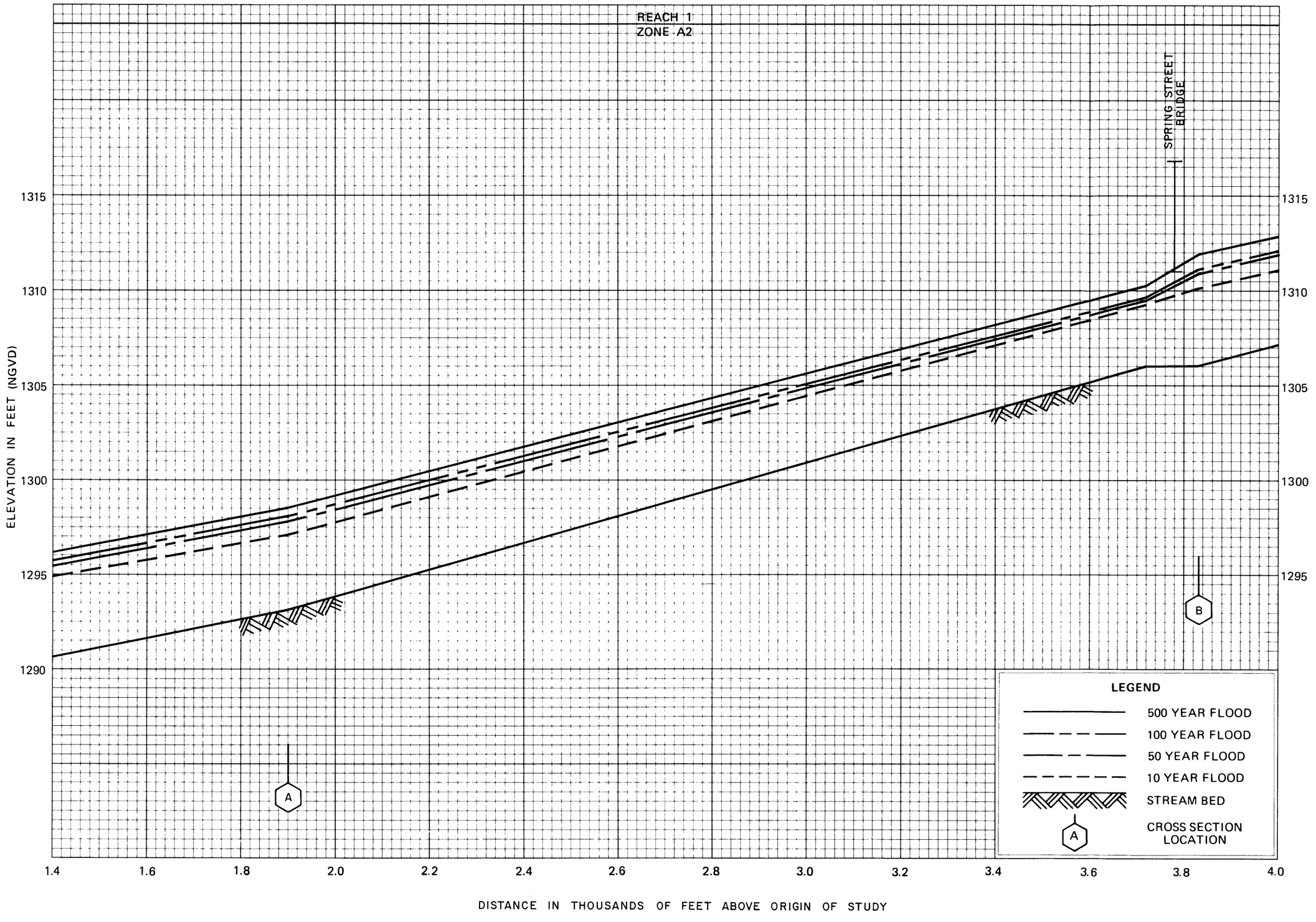
ELM CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

01P

EXHIBIT 1



FLOOD PROFILES

ELM CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

02P

EXHIBIT 1

REACH 1
ZONE A2

CONFLUENCE WITH STILLSON POND TRIBUTARY

MAIN STREET BRIDGE

ELEVATION IN FEET (NGVD)

1335
1330
1325
1320
1315
1310
1305

4.0 4.2 4.4 4.6 4.8 5.0 5.2 5.4 5.6 5.8 6.0 6.2 6.4 6.6

DISTANCE IN THOUSANDS OF FEET ABOVE ORIGIN OF STUDY

C

D

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

FLOOD PROFILES

ELM CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

03P

EXHIBIT 1

REACH 1
ZONE A2

CORPORATE LIMITS

ELEVATION IN FEET (NGVD)

1345
1340
1335
1330
1325

E
F

6.6 6.8 7.0 7.2 7.4 7.6 7.8 8.0

DISTANCE IN THOUSANDS OF FEET ABOVE ORIGIN OF STUDY

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

FLOOD PROFILES

ELM CREEK

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

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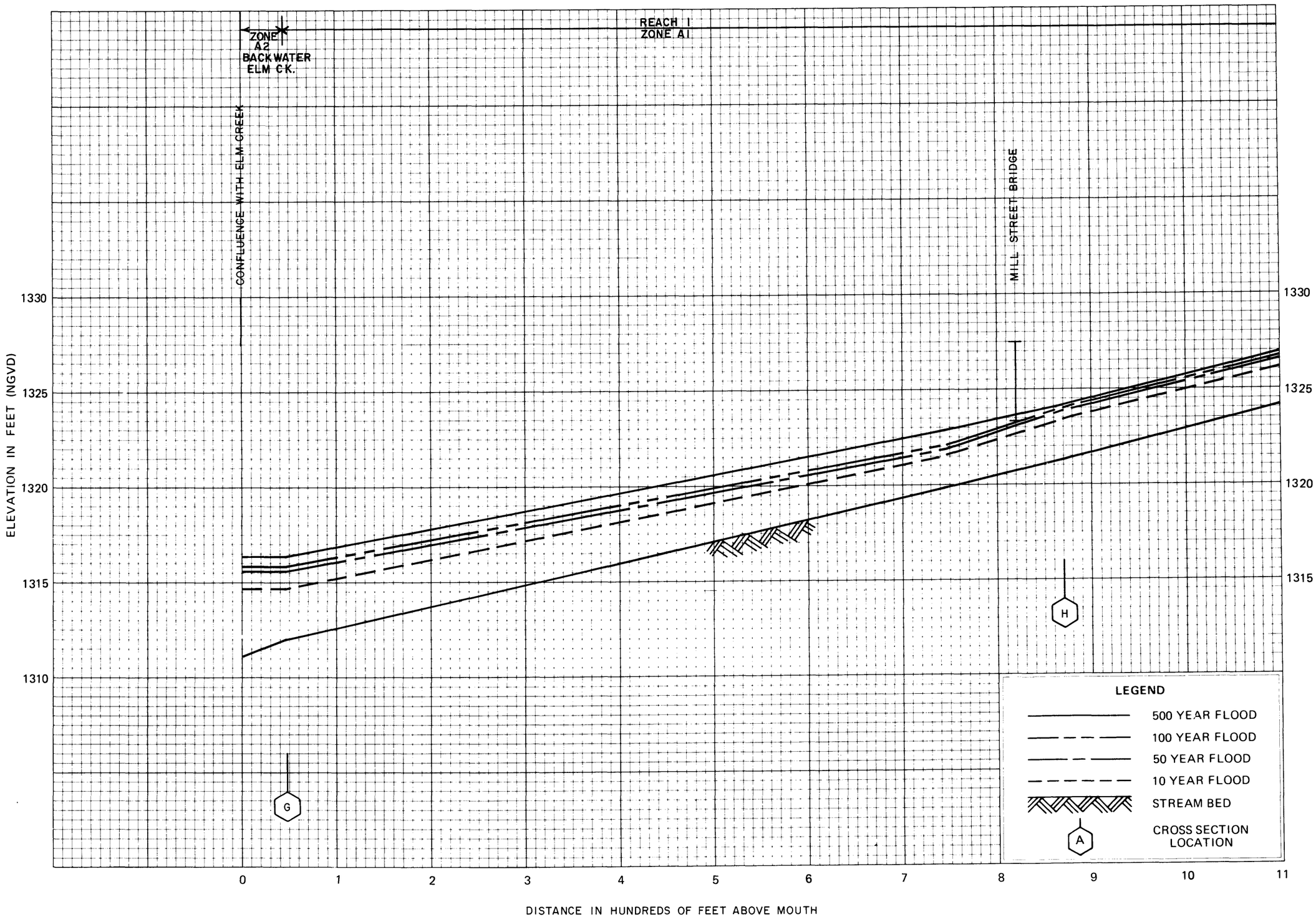
EXHIBIT 1



FLOOD PROFILES

STILLSON POND TRIBUTARY

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

05P

EXHIBIT 1

REACH 1
ZONE A1

CORPORATE LIMITS

ELEVATION IN FEET (NGVD)

1350
1345
1340
1335
1330
1325
1320

11 12 13 14 15 16 17 18 19 20 21 22 23

DISTANCE IN HUNDREDS OF FEET ABOVE MOUTH

1

LEGEND

- 500 YEAR FLOOD
- 100 YEAR FLOOD
- 50 YEAR FLOOD
- 10 YEAR FLOOD
- STREAM BED
- A — CROSS SECTION LOCATION

FLOOD PROFILES

STILLSON POND TRIBUTARY

DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
Federal Insurance Administration

VILLAGE OF EAST RANDOLPH, NY
(CATTARAUGUS CO.)

06P

EXHIBIT 1